

## CLAIMS

What is claimed is:

1. A coil structure for a dynamoelectric machine, comprising:  
a lamination stack having a plurality of slots in which magnet wires are wound forming coils having end coil extending between slots of the lamination stack;  
thermally conductive plastic molded around the magnet wires and end coils; and  
at least one feature pre-formed of material having a thermal conductivity higher than that of the thermally conductive plastic insert molded on at least one of the end coils when the plastic is molded.
2. The coil structure of claim 1 wherein the feature includes at least one end cap.
3. The coil structure of claim 2 wherein the end cap is formed of at least one of metal and thermally conductive plastic.
4. The coil structure of claim 2 wherein the end cap includes fins.
5. The coil structure of claim 1 wherein the feature includes at least one fin.

6. The coil structure of claim 5 wherein the fin is formed of at least one of metal and thermally conductive plastic.
7. The coil structure of claim 1 wherein the coil structure is a coil structure for an armature of an electric motor.
8. The coil structure of claim 7 wherein the feature includes at least one end cap.
9. The coil structure of claim 8 wherein the end cap includes fins.
10. The coil structure of claim 1 wherein the coil structure is a coil structure for a stator of an electric motor.
11. The coil structure of claim 1 wherein the dynamoelectric machine is a generator.
12. The coil structure of claim 1 wherein the dynamoelectric machine is an alternator.

13. An armature for an electric motor, comprising:  
a shaft having a lamination stack thereon;  
the lamination stack having a plurality of slots in which magnet wires are wound forming coils having end coils at opposed ends of the lamination stack;  
thermally conductive plastic molded around the coils including the end coils; and  
at least one feature pre-formed of material having a thermal conductivity higher than that of the thermally conductive plastic insert molded on at least one of the end coils when the plastic is molded.
14. The armature of claim 13 wherein the feature includes at least one end cap.
15. The armature of claim 14 wherein the feature further includes a fan.
16. The armature of claim 13 wherein the feature includes fins.
17. The armature of claim 13 wherein the slots of the lamination stack includes slot liners made of thermally conductive plastic.

18. The armature of claim 13 wherein the magnet wires have a layer of heat activated adhesive thereon, the thermally conductive plastic molded around the magnet wires and the heat of the thermally conductive plastic as it is molded activating the heat activated adhesive on the magnet wires and bonding the magnet wires together.

19. The armature of claim 13 wherein at least one fan is formed of the thermally conductive plastic when the thermally conductive plastic is molded to at least partially encase the magnet wires.

20. A coil structure for a dynamoelectric machine, comprising:  
a lamination stack having a plurality of slots in which magnet wires are wound forming coils having end coils extending between slots in the lamination stack;  
thermally conductive plastic molded around the magnet wires; the thermally conductive plastic molded to form an end dome over at least one of the end coils, the end dome having a metallic layer thereon.

21. The coil structure of claim 20 wherein the thermally conductive plastic is molded to form the end dome with at least one feature, the feature having the metallic layer thereon.

22. The coil structure of claim 21 wherein the feature includes at least one of a fin, post and blade.

23. The coil structure of claim 20 wherein the coil structure is a coil structure for an armature of an electric motor.

24. The apparatus of claim 20 wherein the coil structure is a coil structure for a stator of an electric motor.

25. The apparatus of claim 20 wherein the dynamoelectric machine is a generator.

26. The apparatus of claim 20 wherein the dynamoelectric machine is an alternator.

27. An armature for an electric motor, comprising:  
a shaft having a lamination stack thereon;  
the lamination stack having a plurality of slots in which magnet wires are wound forming coils having end coils at opposed ends of the lamination stack; and  
thermally conductive plastic molded around the magnet wires; the thermally conductive plastic molded to form an end dome over at least one of the end coils, the end dome having a metallic layer thereon.

28. The armature of claim 27 wherein the thermally conductive plastic is molded to form the end dome with at least one feature, the feature having the metallic layer thereon.

29. The armature of claim 28 wherein the feature includes at least one of a fin, post and blade.

30. The armature of claim 27 wherein the slots of the lamination stack includes slot liners made of thermally conductive plastic.

31. The armature of claim 27 wherein the magnet wires have a layer of heat activated adhesive thereon, the thermally conductive plastic molded around the magnet wires and the heat of the thermally conductive plastic as it is molded activating the heat activated adhesive on the magnet wires and bonding the magnet wires together.

32. The armature of claim 27 wherein at least one fan is formed of the thermally conductive plastic when the thermally conductive plastic is molded to at least partially encase the magnet wires.

33. A method for forming an armature for an electric motor, comprising:  
securing a lamination stack having slots therein on an armature shaft;  
securing a commutator on one end of the armature shaft;  
winding magnet wires in the slots in the lamination stack and securing ends of the magnet wires to the commutator;  
molding plastic around the lamination stack, commutator and magnet wires; and  
machining off excess plastic.

34. The method of claim 33 wherein the plastic is thermally conductive plastic.

35. The method of claim 34 and further including forming at least one fan of the thermally conductive plastic during the molding of the thermally conductive plastic.

36. The method of claim 33 wherein winding magnet wires in the slots includes winding magnet wires having a layer of heat activated adhesive thereon and activating the heat activated adhesive with heat of the plastic during the molding of the plastic.

37. The method of claim 33 and further including lining the slots in the lamination stack with slot liners made of thermally conductive plastic.

38. A coil structure for a dynamoelectric machine, comprising:  
a lamination stack having a plurality of slots in which magnet wires are wound forming coils having end coil extending between slots of the lamination stack;  
thermally conductive plastic molded around the magnet wires and end coils; and  
at least one feature pre-formed of material that is more physically robust than the thermally conductive plastic that is insert molded to the coil structure when the thermally conductive plastic is molded.

39. The coil structure of claim 38 wherein the feature includes a fan.

40. The coil structure of claim 38 wherein the coil structure is a coil structure for an armature of an electric motor.



41. The coil structure of claim 38 wherein the coil structure is a coil structure for a stator of an electric motor.

42. The coil structure of claim 38 wherein the dynamoelectric machine is a generator.

43. The coil structure of claim 38 wherein the dynamoelectric machine is an alternator.

44. An armature for an electric motor, comprising:  
a shaft having a lamination stack thereon;  
the lamination stack having a plurality of slots in which magnet wires are wound forming coils having end coils at opposed ends of the lamination stack;  
thermally conductive plastic molded around the coils including the end coils; and  
at least one feature pre-formed of material that is more physically robust than the thermally conductive plastic that is insert molded to the armature when the plastic is molded.

45. The armature of claim 44 wherein the feature includes a fan.

46. The armature of claim 44 wherein the slots of the lamination stack includes slot liners made of thermally conductive plastic.

47. The armature of claim 44 wherein the magnet wires have a layer of heat activated adhesive thereon, the thermally conductive plastic molded around the magnet wires and the heat of the thermally conductive plastic as it is molded activating the heat activated adhesive on the magnet wires and bonding the magnet wires together.

48. A method for forming an armature, comprising:  
securing a lamination stack having slots therein on an armature shaft;  
securing a commutator on one end of the armature shaft;  
winding magnet wires in the slots in the lamination stack and securing ends of the magnet wires to the commutator;  
molding plastic to at least partially encase the magnet wires in the plastic wherein a feature pre-formed of material that is physically more robust than the plastic is insert molded to the armature when the plastic is molded.

49. The method of claim 48 wherein winding magnet wires in the slots includes winding magnet wires having a layer of heat activated adhesive thereon and activating the heat activated adhesive with heat of the plastic during the molding of the plastic.

50. The method of claim 48 and further including lining the slots in the lamination stack with slot liners made of thermally conductive plastic.

51. The method of claim 48 and further including forming at least one fan of the thermally conductive plastic during the molding of the thermally conductive plastic.

52. An armature for an electric motor, comprising:  
a lamination stack having slots therein;  
an internal shaft extending coaxially through the lamination stack;  
a plurality of magnet wires wound in the slots of the lamination stack;  
a commutator disposed on the armature shaft to which ends of the magnet wires are electrically coupled;  
the internal shaft coupled to an external pinion and bearing journal by an insulated coupling; and  
thermally conductive plastic at least partially encasing the magnet wires.

53. The armature of claim 52 wherein the insulated coupling includes the bearing journal having a cylindrical cavity lined with a layer of insulation with the internal shaft received in the cylindrical cavity.

54. The armature of claim 52 wherein the insulated coupling includes the bearing journal having a cylindrical cavity lined with a layer of insulation with the pinion received in the cylindrical cavity, the internal shaft coupled to the bearing journal.

55. The armature of claim 52 wherein the slots of the lamination stack includes slot liners made of thermally conductive plastic.

56. The armature of claim 52 wherein the magnet wires have a layer of heat activated adhesive thereon, the thermally conductive plastic molded around the magnet wires and the heat of the thermally conductive plastic as it is molded activating the heat activated adhesive on the magnet wires and bonding the magnet wires together.

57. The armature of claim 52 wherein at least one fan is formed of the thermally conductive plastic when the thermally conductive plastic is molded to at least partially encase the magnet wires.

58. A method for forming an armature for an electric motor, comprising:  
securing a lamination stack having slots therein on an armature shaft;  
securing a commutator on one end of the armature shaft;  
winding magnet wires in the slots in the lamination stack and securing ends of the magnet wires to the commutator; and  
molding thermally conductive plastic to at least partially encase the magnet wires in plastic, the thermally conductive plastic having at least one phase change additive.

59. The method of claim 58 wherein the phase change additive changes from a solid to a liquid as a temperature of the plastic increases.

60. The method of claim 58 wherein the phase change additive is at least one of a parafin, wax, and hydrated salt.

61. The method of claim 58 wherein the phase change additive is a crystalline plastic.

62. The method of claim 61 wherein the crystalline plastic is at least one of acetal and nylon.

63. The method of claim 58 wherein winding magnet wires in the slots includes winding magnet wires having a layer of heat activated adhesive thereon and activating the heat activated adhesive with heat of the thermally conductive plastic during the molding of the thermally conductive plastic.

64. The method of claim 58 and further including lining the slots in the lamination stack with slot liners made of thermally conductive plastic.

65. The method of claim 58 and further including forming at least one fan of the thermally conductive plastic during the molding of the thermally conductive plastic.

66. An armature for an electric motor, comprising:  
a lamination stack having slots therein;  
an armature shaft extending coaxially through the lamination stack;  
a plurality of magnet wires wound in the slots of the lamination stack;  
a commutator disposed on the armature shaft to which ends of the magnet wires are electrically coupled; and

thermally conductive plastic at least partially encasing the magnet wires, the thermally conductive plastic having at least one phase change additive therein.

67. The armature of claim 66 wherein the phase change additive changes from a solid to a liquid as a temperature of the plastic increases.

68. The armature of claim 66 wherein the phase change additive is at least one of a parafin, wax, and hydrated salt.

69. The armature of claim 66 wherein the phase change additive is a crystalline plastic.

70. The armature of claim 69 wherein the crystalline plastic is at least one of acetal and nylon.

71. The armature of claim 66 wherein the slots of the lamination stack includes slot liners made of thermally conductive plastic.

72. The armature of claim 66 wherein the magnet wires have a layer of heat activated adhesive thereon, the thermally conductive plastic molded around the magnet wires and the heat of the thermally conductive plastic as it is molded activating the heat activated adhesive on the magnet wires and bonding the magnet wires together.

73. The armature of claim 66 wherein at least one fan is formed of the thermally conductive plastic as the thermally conductive plastic is molded to at least partially encase the magnet wires.